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Biological inventory of Koolan Island, Western Australia 1. Flora and vegetation

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Abstract - A total of 282 plant taxa have been recorded from five major vegetation units on Koolan Island at the head of the Yampi Peninsula. This represents over a quarter of the flora recorded for the Fitzgerald Botanical District. A total of 12 new naturalised weeds were recorded from the island. The closure of the iron ore mine on Koolan Island and the removal of the town will provide opportunities to study both weed invasion and persistence and the establishment of a large permanent wetland in a sub-humid tropical environment.

INTRODUCTION

A biological survey of Koolan Island was undertaken over a week during the wet season of February 1993. This survey was supplemented by herbarium records and previous collections by KFK and AAM. This paper describes the flora and vegetation of the island, while a subsequent paper will describe the island's fauna. This work will provide a benchmark against which to measure the rehabilitation of the island following closure of the major iron ore mine in October 1993 after 29 years of operation. Despite a long history of exploration and mining on the island its flora and vegetation have been little studied, with the earliest collections in the Western Australian Herbarium (PERTH) dating from the mid 1960s (also see Beard 1979).

STUDY AREA

Koolan Island is located 130 km north of Derby at the northern end of the Yampi Peninsula. It is separated from the mainland by a channel 1 km wide. The island is 13 km long and 5.5 km wide at its widest point, with the long axis of the island orientated NW – SE (Figure 1). Koolan is one of the many islands of the Buccaneer Archipelago. This area experiences a monsoonal climate with an annual rainfall of about 960 mm with most falling between December and March. Mean summer temperatures for Derby (some 130 km to the south) range from 35 to 37 degrees with high relative humidities (Bureau of Meteorology 1975).

The island is essentially a series of parallel flat-topped ridges formed from steeply dipping beds of the resistant Warton and Pentecost Sandstones and a series of deeply incised creeks through softer Elgee Siltstone (Tyler and Griffin 1993). The adjacent mainland has essentially similar geology and geomorphology. The basal part of the Pentecost Sandstone on Koolan Island is composed of high grade haematite (iron ore) and was mined from 1965 until 1993.

This ore proved to be of very high grade (average 65% iron) with over 50 million tonnes having been extracted. A smaller mine operated on nearby Cockatoo Island between 1957 and 1986. The main pit on Koolan Island is 1.5 km long, 45 m wide and was mined at the eastern end to a depth of 80 m below sea level. This pit will fill with fresh water from a natural aquifer once mining operations cease.

The town associated with this mine was located at the eastern end of the island and had a population of 850 people. Most of the towns people left in October 1992 with complete closure planned by October 1993. It is planned that all buildings will be removed and all road surfaces removed and ripped. Only the airstrip will be left intact.

METHODS

During the wet season survey most of the field work was concentrated on the eastern two thirds of the island along roads and down creek lines. The area of Warton Sandstone along the southern edge of the island, supporting very open eucalypt woodland (Figure 1), was not visited due to time

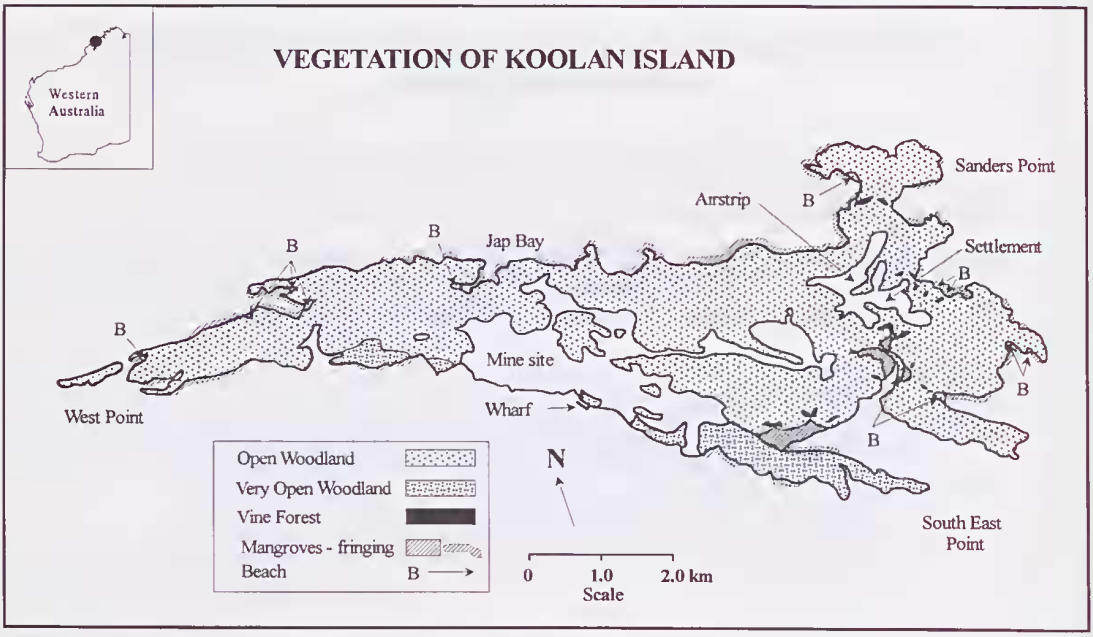

Figure 1 Map of Koolan Island, showing major vegetation types and location of town, airstrip and mine.

and access limitations. Voucher collections were made of all fertile plants found and notes made on their distribution and abundance. While detailed searches were undertaken for naturalised weed taxa, due to time limitations no attempt was made to record all exotic taxa found in the townsite. Vouchers were lodged in PERTH. Nomenclature largely follows Wheeler *et al.* (1992). Additional records were available from previous visits by KFK and AAM as well as other collections lodged in PERTH.

A structural vegetation map was compiled from field notes and a 1: 30 000 colour mosaic based on August 1992 photography (Figure 1).

RESULTS AND DISCUSSION

Flora

Two hundred and eighty-two taxa (species, subspecies and varieties) were recorded from 79 families. Forty-three of these were exotic taxa from 19 different families; three of these families (Moringaceae, Solanaceae and Turneraceae) were only represented by introduced taxa. The most well represented families were the Poaceae (22 native, 11 naturalised taxa), Papilionaceae (15 native, 5 naturalised taxa), Euphorbiaceae (15 native, 3 naturalised taxa), and Myrtaceae (11 native taxa) (Appendix 1). Species composition clearly shows the tropical nature of the flora with high proportions of grasses and Euphorbiaceae. It is, however, a sub-humid tropical flora sharing only 12% of the evergreen tropical flora of Christmas Island (Gentilli 1972, Du Puy 1993). Approximately half of the species co-occurring between the two islands are pan-tropical weeds.

Koolan Island falls on the western margin of the Fitzgerald Botanical District which covers some 83,330 km^2 (Beard 1979). The flora of this area is still poorly known. Hnatiuk (1990) recorded 842 taxa from this region while the recently completed Kimberley Flora (Wheeler *et al.* 1992) record 1030 taxa. The present survey has added a further 24 taxa. Thus, 27 % of the flora of the entire Fitzgerald Botanical District has been recorded on Koolan Island although the island represents less than 0.1% of the land area of this District.

Weeds

Several weed taxa were largely restricted to the six steep gullies north and south of the townsite down which the treated sewage was discharged (Figure 2). In particular *Euphorbia cyathophora* and *Clitoria ternatea* were common and locally dominant in the bottoms of these gullies. In Creeks 1 and 2 on the north side of the settlement *Senna alata*, a garden escape, has become wide spread, reaching heights of 4 m. This is the first record of this species naturalised in Western Australia. It is also naturalised in the Darwin area. Another garden escape which has become widespread along the road verges and in the creeks is *Turnera*

ulmifolia, a small yellow flowering herb. This taxa has also not previously been recorded elsewhere in Western Australia.

In a vegetated valley near the southern boundary of the town site, a small but vigorous population of rubber vine (*Cryptostegia madagascariensis*) was found. The creek line running south from this valley (Creek 4) was dominated by *Leucaena leucocephala*. The Poinciana (*Delonix regia*) was also found in this area and is the first time this taxon has been recorded as naturalised in Western Australia. The *Leucaena leucocephala* and *Delonix regia* were also found in the two smaller creek lines (Creeks 5 and 6) at the south west end of town.

Eleven species of grass have become naturalised including buffel grass (*Cenchrus ciliaris*). This species has become a very serious weed at Cape Range (near Exmouth) where it was planted along the coastal flats as improved pasture and has subsequently spread through most of the plant communities of the area (Keighery and Gibson 1993).

Currently all the weeds are restricted to the settlement area (including creek lines and sewerage outfalls) and road verges. With closure of the town supplementary irrigation and sewerage output will cease. This is likely to lead to long term loss of weed taxa given the extended dry season in this area. Weedy tree species may persist but success of further recruitment is uncertain. Experience in areas such as Cape Range suggests some of the exotic grasses will persist. The current distribution of *Cryptostegia madagascariensis* elsewhere in Australia suggests that this species will also persist and spread unless efforts are made to eradicate it. It should be noted that of the several hundred taxa present in the town gardens, only 44 have become naturalised (Appendix 1).

Vegetation

Five major vegetation units were found on the island. There were also several minor units but these occupied areas too small to map (Figure 1).

The most widespread community was the *Eucalyptus miniata - Eucalyptus confertiflora* open woodlands generally over *Triodia* hummock grassland. The understorey was composed of a diverse herb layer with species such as *Tacca leontopetaloides* and *T. maculata* being common. The density of shrubs in this community is variable but several species of *Terminalia* and *Acacia* are common (Appendix 1). This vegetation type covers about 80% of the non-disturbed area of the island and is the common vegetation type on the adjacent mainland (Beard 1979). The floristics of this community are fairly consistent, however there is considerable local change in dominance across the island. This floristic variation did not appear to be

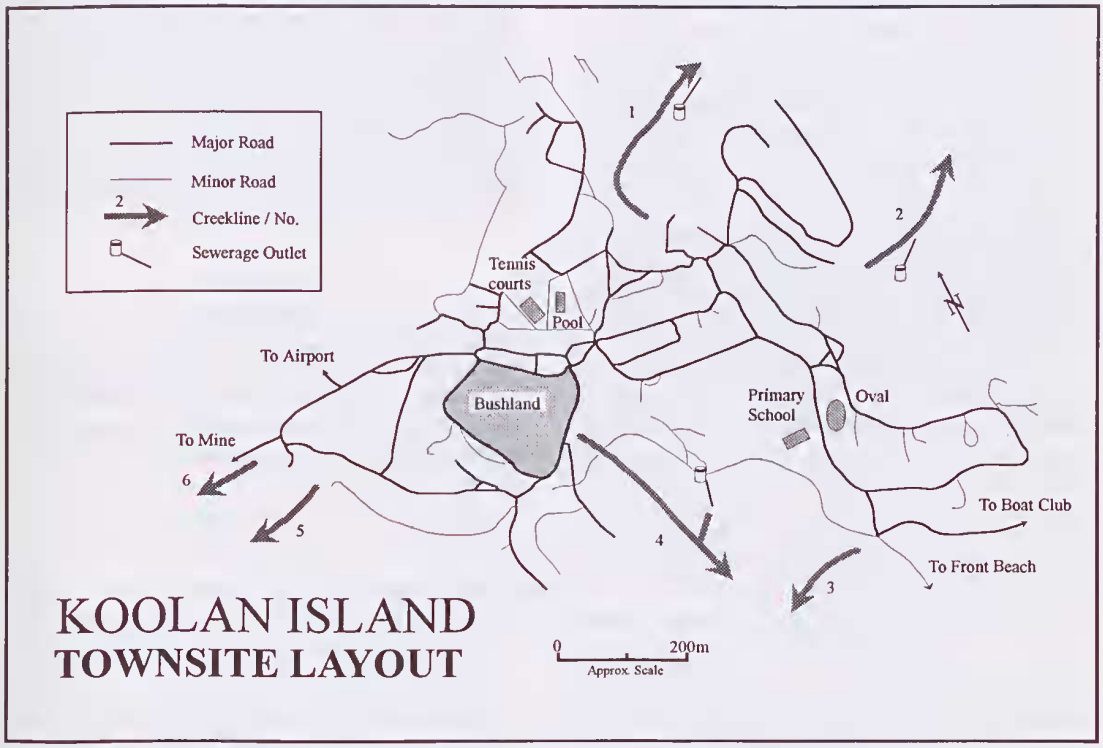

Figure 2 Map of the townsite showing location of creek lines and sewerage outfalls.

correlated to slope or aspect and occurred on both the Pentecost Sandstone and the Elgee Siltstone. In places it gave way to small groves of *Callitris intratropica* with understoreys dominated by *Calytrix exstipulata*. This community type has previously been recorded on the nearby Cockatoo, Irvine, Bathurst and Kingfisher Islands (previously known as the Wood Islands) some 30 km to the east on the same lithologies (Burbidge *et al.* 1978; K.F. Kenneally, unpub).

Aerial photographs show a very open eucalypt woodland along the southern edge of the island coincident with the Warton Sandstone (Tyler and Griffin 1993). This area was not surveyed due to both time and access limitations. Woodlands on this substrate type have been described for Augustus, Heywood, Champagny, Unwins and Saint Andrew Islands of the Bonaparte Archipelago lying some 130 km to the north east (Burbidge *et al.* 1978) and for an area in the proposed Prince Regent National Park (Miles *et al.* 1975). The composition of the woodlands on the Warton Sandstone is similar to the *Eucalyptus miniata - Eucalyptus confertiflora* open woodlands described above, but commonly also including *Eucalyptus perfoliata*, *Plectrachne pungens*, and less commonly *Eucalyptus ferruginea* and *Acacia stipulosa*.

Large mangrove communities occur in two sheltered bays south of the settlement. In addition, much of the coastline of the island supports a narrow mangrove fringe (Figure 1). Four species of mangrove were recorded from the large stand immediately south of the settlement: *Avicennia marina*, *Camptostemon schultzii*, *Excoecaria agallocha* and *Rhizophora stylosa*. The mangrove communities are small and species poor compared to the much more extensive mangrove stands on the nearby mainland (Kenneally 1982).

Small patches of vine forest dominated by *Canarium australianum* were found in the steep creek lines on the eastern end of the island (Figure 1). Patch size ranges from just a few trees to several hectares in extent. The patches shown in Figure 1 are those that were visited on the ground and / or were discernible on the photo-mosaic. There are undoubtedly more smaller patches than could be mapped at this scale. Koolan Island is at the south western edge of the main area of occurrence of rainforest in the Kimberley. The only patches further to the south west are those on the northern shore of King Sound and the coastal areas of the Dampier Peninsula (McKenzie 1991).

More than 1500 patches of rainforest are scattered across the Kimberley. These range in size from a few tree crowns to more than 100 ha (McKenzie 1991). Kenneally *et al.* (1991) in a study of 99 Kimberley rainforests (largely vine forest) recorded 575 species. Only one of these species was endemic to the rainforest, with most species occurring widely in a number of habitats across northern Australia. The reason for the widespread nature of most of these species appears to be both their ability to cope with nutrient-poor substrates and propagule dispersal by birds and bats (McKenzie 1991). Our data are consistent with this hypothesis. One hundred and one of the 575 species recorded from Kimberley rainforest patches are found on Koolan Island.

Koolan Island shares 45.5 and 52.1% of the taxa recorded from the two closest rainforest patches studied by Kenneally *et al.* (1991) (02/3 and 25/3 on Yampi Peninsula, some 50 km to the east south east, with 33 and 46 species respectively). These data further indicate the widespread nature of the Kimberley rainforest flora.

Twelve small beaches occurred in protected bays around Koolan Island. Most of the beaches are adjacent to mangrove community but, in addition, a distinct community develops on the mobile sands. Common components of these beach communities include *Spinifex longifolius*, *Commelina ensifolia*, *Ipomoea pes-caprae* and *Abrus precatorius*. Two beaches to the south east of the settlement and another north of the airfield were frequently used by the residents for recreation and were serviced by gravel roads.

Minor vegetation units include the narrow fringing vegetation of *Melaleuca viridiflora* along some of the larger creek lines, and the *Callitris intratropica* stands. Species-poor haematite scree communities, seen at several locations. These were dominated by combinations of trees and / or shrubs. Common species included *Callitris intratropica*, *Canarium australianum*, *Ponteria sericea*, *Vitex acuminata* and *Pavetta kimberleyana*. All of these units are restricted to a few hectares in extent.

DISCUSSION

The flora and vegetation of Koolan Island is very similar to both the adjacent mainland and nearby Cockatoo Island. It is a sub-humid tropical sandstone flora which is widespread across northern Australia. Twelve new naturalised weeds for Western Australia were recorded from the island (*Allamanda cathartica*, *Antigon leptopus*, *Cascabela thevetia*, *Cassia fistula*, *Delonix regia*, *Gliricidia sepium*, *Moringa oleifera*, *Peltophorum pterocarpa*, *Ruellia tuberosa*, *Senna alata*, *Tecoma stans*, *Turnera ulmifolia*). *Antigon leptopus*, *Delonix regia*, *Tecoma stans*, and *Turnera ulmifolia* are also common weeds on Christmas Island.

One native species was found to be restricted to Koolan Island. This was an apparently undescribed species of smooth, white barked eucalypt (*E.* aff. *cadophora* Keighery and Gibson 15 and 95). This taxon was found occasionally across the island.

None of the native taxa reached their range ends on Koolan Island.

Koolan Island presents a excellent opportunity for long term monitoring of weed invasion and persistence following major disturbance in an isolated sub-humid tropical environment. The townsite will also allow an opportunity to study the fate of the introduced garden species following the removal of town infrastructure and supplementary watering.

One major new habitat created by the mine will be an extensive, deep permanent freshwater wetland in the bottom of the major pit (next to the loading jetty, Figure 1) which has intersected a shallow aquifer. We are unaware of any similar habitat on the sandstone areas of the adjacent mainland. The colonisation of this wetland will add significant numbers of new taxa to the flora of the island. At the date of the present survey the pit was bare of all vegetation and water levels were being kept artificially low by continuous pumping.

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APPENDIX 1

Flora list of 282 taxa recorded from Koolan Island, Western Australia. Collection numbers refer to specimens lodged in PERTH. * indicates a naturalised weed and "sr" indicates a sight record.

Family Acanthaceae	
Dicliptera armata F.Muell.	Vernon 40
Hypoestes sp.	Vernon 51
* *Ruellia tuberosa*	L. Mitchell 3118

Family Adiantaceae	
Cheilanthes brownii (Kuhn)Domin	Keighery/Gibson 249
Cheilanthes caudata R.Br.	Keighery/Gibson 250
Cheilanthes sieberi Kunze	Keighery sr
Cheilanthes tenuifolia (Burm.f.)Sw.	Keighery sr
Family Aizoaceae	
Sesuvium portulacastrum (L.)L.	Keighery sr
Zaleya galericulata (Melville)H.Eichler	Keighery sr
Family Amaranthaceae	
Achyranthes aspera L.	Keighery sr
Amaranthus pallidiflorus F.Muell.	Keighery sr
* *Amaranthus viridis* L.	Keighery/Gibson 131
Gomphrena sp.	Keighery/Gibson 128
Ptilotus exaltatus Nees in Lehm.	Keighery/Gibson 210
Ptilotus fusiformis (R.Br.) Steud. var. *gracilis* (R.Br.) Benl	Vernon 43
Family Anacardiaceae	
Buchanania obovata Engl.	Kenneally sr
Family Apiaceae	
Trachymene didiscoides (F.Muell.)B.L.Burtt	Fryxell 3915, Vernon 06
Family Apocynaceae	
* *Allamanda cathartica* L.	Keighery/Gibson 91
* *Cascabela thevetia* L.	Mitchell 3116, Keighery/Gibson 28
* *Catharanthus roseus* (L.)G.Don	Keighery/Gibson 30
Tabernaemontana pandacaqui Lam.	Keighery/Gibson 47
Wrightia saligna (R.Br.)Benth.	Vernon 23, Keighery/Gibson 02, 211
Family Asclepiadaceae	
Cynanchum carnosum (R.Br.)Schltr.	Keighery/Gibson 46
Cynanchum puberulum F.Muell.ex Benth.	Vernon 62
Gymnema stenophyllum A.Gray	Keighery/Gibson 134
Marsdenia viridiflora R.Br.	Keighery/Gibson 62
Sarcostemma viminale subsp. *australe* (R.Br.) P.I. Forst.	Vernon sn
Secamone timoriense Decne.	Keighery/Gibson 40
Tylophora flexuosa R.Br.	Keighery/Gibson 88
* *Cryptostegia madagascariensis* Bojer ex Decne.	Mitchell 2276, 3117, Keighery/Gibson 26
Family Asparagaceae	
Protasparagus racemosus (Willd.)Oberm.	Keighery sr
Family Asteraceae	
* *Bidens bipinnata* L.	Kenneally sr, Keighery sr
Chrysogonum ecliptoides (F.Muell.)F.Muell.	Kenneally sr
Pterocaulon sphacelatum (Labill.)F.Muell.	Vernon 72
* *Tridax procumbens* L.	Marchant 72/1, Keighery/Gibson 129
Vernonia cinerea (L.)Less.	Vernon 20, k127
Family Avicenniaceae	
Avicennia marina (Forssk.)Vierh.	Keighery/Gibson 212
Family Bignoniaceae	
Dolichandrone heterophylla (R.Br.)F.Muell.	Keighery/Gibson 105
* *Tecoma stans* (L.) Juss. ex Kunth	Keighery/Gibson 32
Family Bombacaceae	
Camptostemon schultzii Mast.	Keighery sr
Family Boraginaceae	
Heliotropium glabellum "yellow variant"	Keighery sr
Heliotropium glabellum R.Br.	Sands 4984, 4976, Keighery/Gibson 145
Trichodesma zeylanicum (Burm.f.)R.Br.	Keighery sr

Family Burseraceae	
Canarium australianum F.Muell.	Keighery/Gibson 48, 68, 136
Family Byblidaceae	
Byblis liniflora Salisb.	Vernon 31
Family Caesalpiniaceae	
* *Cassia fistula* L.	Mitchell sr
Chamaecrista mimosoides (L.)Greene	Keighery/Gibson 213
* *Delonix regia* (Bojer ex Hook.) Rafin.	Keighery/Gibson 59
Erythrophleum chlorostachys (F.Muell.)Baill.	Vernon 12
Lysiphyllum cunninghamii (Benth.)de Wit	Vernon 04
* *Peltophorum pterocarpa* (DC)Backer ex K. Heyner	Keighery sr
* *Senna alata* (L.)Roxb.	Keighery/Gibson 77, Mitchell 3111
Senna goniodes (A.Cunn.ex Benth.)Randell	Vernon 42, Keighery/Gibson 109
Family Capparaceae	
Capparis lasiantha R.Br.ex DC.	Keighery/Gibson 214, 248
Capparis sepiaria L.	Keighery sr
Capparis spinosa L. var. *nummularia* (DC.)Bailey	Vernon 64
Cleome viscosa L.	Keighery sr
Family Caryophyllaceae	
Polycarpaea spirostylis F.Muell.	Keighery sr
Family Celastraceae	
Denhamia obscura (A.Rich.)Meisn.	Keighery/Gibson 215A, 215B
Family Chenopodiaceae	
Salsola kali L.	Kenneally sr
Suaeda arbusculoides L.S.Sm.	Keighery sr
Family Combretaceae	
Terminalia canescens (DC.)Radlk.	Vernon 27, Keighery/Gibson 41
Terminalia latipes Benth. subsp. *psilocarpa* Pedley	Vernon 10, Keighery/Gibson 87
Terminalia platyphylla F.Muell.	Keighery sr
Family Commelinaceae	
Cartonema spicatum R.Br.	Vernon 30, Keighery/Gibson 247
Commelina ensifolia R.Br.	Vernon 29, Keighery/Gibson 37
Murdannia graminea (R.Br.)G.Brueckn.	Vernon 38
Family Convolvulaceae	
Evolvulus alsinoides (L.)L.	Vernon 33
Ipomoea sp.	Vernon 48
Ipomoea pes-caprae (L.)R.Br.	Keighery sr
* *Ipomoea quamoclit* L.	Mitchell 2272, Keighery/Gibson 05,
Jacquemontia paniculata (Burm.f.)Hallier	Vernon 47, Fryxell 4598, Keighery/Gibson 119
* *Merremia dissecta* (Jacq.)Hallier	Keighery/Gibson 50
Operculina brownii Ooststr.	Fryxell 4607
Polymeria ambigua R.Br.	Keighery/Gibson 113
Xenostegia tridentata (L.) D.Austin et Staples subsp. *hastata* (Desr.) Ooststr.	Keighery/Gibson 216
Family Cucurbitaceae	
* *Cucumis melo* L. subsp. *agrestis* (Naudin)Grebensc.	Keighery/Gibson 57
Mukia maderaspatana (L.)M.Roem.	Keighery sr
Trichosanthes cucumerina L. var. *cucumerina*	Keighery/Gibson 135
Family Cupressaceae	
Callitris intratropica (F.Muell.)R.T.Baker and H.G.Sm.	Keighery/Gibson 67
Family Cyperaceae	
Cyperus bulbosus M.Vahl	Keighery/Gibson 217
Fimbristylis cymosa R.Br.	Keighery/Gibson 94, 150

Family Dilleniaceae	
Hibbertia oblongata R.Br.ex DC.	Vernon 57, Fryxell 4592, Keighery/Gibson 112
Family Dioscoreaceae	
Dioscorea bulbifera L.	Keighery/Gibson 17
Family Droseraceae	
Drosera lanata Kondo	Keighery sr
Drosera petiolaris R.Br.ex DC.	Vernon "a"
Family Ebenaceae	
Diospyros maritima Blume	Keighery/Gibson 31, 152
Family Elatinaceae	
Bergia pusilla Benth.	Keighery/Gibson 289
Family Euphorbiaceae	
Croton sp.	Keighery sr
Breynia cernua (Poir.)Muell.Arg.	Keighery/Gibson 110
Bridelia tomentosa Blume	Vernon 02
Euphorbia australis Boiss.	Keighery sr
Euphorbia coghlanii Bailey	Keighery sr
* *Euphorbia cyathophora* Murray	Keighery/Gibson 04, Handasyde 01
Euphorbia drummondii Boiss.	Keighery sr
* *Euphorbia hirta* L.	Keighery/Gibson 06
Euphorbia kimberleyensis B.G.Thomson	Fryxell 4582
Excoecaria agallocha L.	Keighery/Gibson 55
Flueggea virosa (Willd.)F.Voigt subsp. *melanthesoides* (F.Muell.)G.L.Webster	Keighery/Gibson 156
* *Jatropha gossypifolia* L.	Keighery/Gibson 100
Petalostigma pubescens Domin	Vernon 22, Keighery/Gibson 66, 218
Petalostigma quadriloculare F.Muell.	Mitchell 2280, 3114
Phyllanthus auarus Schumach.	Keighery/Gibson 44
Phyllanthus maderaspatensis L.	Keighery/Gibson 19
Phyllanthus virgatus G.Forst.	Keighery/Gibson 54
Sebastiania chamelaea (L.)Muell.Arg.	Vernon 21, Keighery/Gibson 121
Family Goodeniaceae	
Goodenia sepalosa F.Muell.ex Benth.	Vernon 19, Fryxell 4599, Mitchell 2265, Keighery/Gibson 20
Scaevola macrostachya (de Vriese)Benth.	Vernon 07, Keighery/Gibson 157
Family Gyrocarpaceae	
Gyrocarpus americanus Jacq.	Keighery sr
Family Haloragaceae	
Gonocarpus leptothecus (F.Muell.)Orchard	Keighery/Gibson 219A
Family Lamiaceae	
Anisomeles malabaricum (L.)R.Br.ex Sims	Mitchell 3112
* *Hyptis suaveolens* (L.)Poit.	Keighery sr
Family Lauraceae	
Cassytha aurea J.Z.Weber	Keighery/Gibson 153
Cassytha capillaris Meisn.	Keighery/Gibson 149
Cassytha filiformis L.	Keighery sr
Family Loganiaceae	
Mitrasacme connata R.Br.	Vernon 36
Strychnos lucida R.Br.	Keighery sr
Family Loranthaceae	
Amyema bifurcata (Benth.)Tiegh.	Keighery/Gibson 291
Amyema miquelii (Lehm.ex Miq.)Tiegh.	Keighery sr
Amyema thalassium Barlow	Keighery/Gibson 147
Decaisnina sp.	Keighery sr

Dendrophthoe acacioides (Benth.)Tiegh.	Keighery/Gibson 65, 106A
Diplatia grandibractea (F.Muell.)Tiegh.	Keighery/Gibson 25
Lysiana spathulata (Blakely)Barlow subsp. *spathulata*	Keighery/Gibson 155
Family Lythraceae	
Lagerstroemia archeriana Bailey	Keighery sr
Family Malvaceae	
Abutilon aff. *oxycarpum* (F. Muell) F. Muell. ex Benth.	Keighery/Gibson 158
Abutilon andrewsianum W.Fitzg	Vernon 54
Abutilon indicum (L.)Sweet	Keighery/Gibson 33
Gossypium costulatum Tod.	Vernon 28, Fryxell 3861, 4619, Mitchell 2278, Lullfitz sn
* *Gossypium hirsutum* L.	Mitchell sr
Hibiscus aff. *fryxellii* Mabb.	Mitchell 3115
Hibiscus leptocladus Benth.	Vernon 55, Keighery/Gibson 53, 159
Thespesia thespesioides (Benth.)Fryxell	Keighery sr
Family Meliaceae	
Owenia vernicosa F.Muell.	Keighery/Gibson 111
Family Menispermaceae	
Tinospora smilacina Benth.	Keighery sr
Family Mimosaceae	
Acacia ampliceps Maslin	Keighery/Gibson 108
Acacia hippuroides Heward ex Benth.	Vernon 04, Vernon 55, Sands 4973
Acacia holosericea A.Cunn.ex G.Don	Kenneally sr
Acacia multisiliqua (Benth.)Maconochie	Vernon 01, Fryxell 4605, Sands 4975, Lakeman 2, Keighery/Gibson 45
Acacia sp. (sec. *juliflorae*)	Done 730, Keighery/Gibson 106, 219
Acacia stigmatophylla A.Cunn.ex Benth.	Vernon 09, White 09, Keighery/Gibson 142, Sands 4946
Acacia tumida F.Muell.ex Benth.	Vernon 70, Kenneally 8531, Sands 4950
* *Leucaena leucocephala* (Lam.)de Wit	Keighery/Gibson 18
Neptunia gracilis Benth.	Keighery/Gibson 12
Family Moraceae	
Ficus opposita Miq.	Keighery/Gibson 49
Ficus virens Aiton	Kenneally sr
Family Moringaceae	
* *Moringa oleifera* Lam.	Keighery/Gibson 230
Family Myrtaceae	
Calytrix brownii (Schauer)Craven	Vernon 69, Fryxell 4601
Calytrix exstipulata DC.	Keighery/Gibson 09
Eucalyptus aff. *cadophora*	Keighery/Gibson 15, 95
Eucalyptus confertiflora F.Muell.	Vernon 14, Keighery/Gibson 148
Eucalyptus dampieri D.J.Carr and S.G.M.Carr	White 11
Eucalyptus miniata A.Cunn.ex Schauer	Kenneally sr
Eucalyptus perfoliata R. Br ex Benth.	Kenneally sr
Eucalyptus rupestris Brooker and Done	Done 737
Eucalyptus sp. B (Kimb flora)	Keighery/Gibson 10
Eucalyptus tectifica F.Muell.	Vernon 18
Melaleuca viridiflora Sol.ex Gaertn.	Keighery/Gibson 11
Family Nyctaginaceae	
Boerhavia sp.	Keighery sr
Boerhavia dominii Meikle and Hewson	Keighery/Gibson 83, 146
Family Oleaceae	
Jasminum didymum G.Forst.	Fryxell 4585
Family Papilionaceae	
Abrus precatorius L.	Keighery sr
Alysicarpus vaginalis(l.) DC.	Keighery/Gibson 52

Cajanus viscidus Maesen	Fryxell 4586, Vernon 56, Mitchell 3109
Canavalia rosea (Sw.)DC.	Fryxell 4587, Keighery/Gibson 84, 122
Christia australasica (Schindler) Bakh. f. et van Meeuwen	Keighery/Gibson 220
* *Clitoria ternatea* L.	Keighery/Gibson 130
Crotalaria montana Roth	Vernon 50, Keighery/Gibson 120
Desmodium filiforme Zoll.and Moritzi	Fryxell 4596
* *Desmodium tortuosum* (Sw.)DC.	Keighery/Gibson 114, Mitchell 2267, 2275
Galactia tenuiflora (Klein ex Willd.)Wight and Arn.	Fryxell 4614
* *Gliricidia sepium* (Jacq.)Kunth ex Walp.	Mitchell 2277, Handysyde 02
Gompholobium subulatum Benth.	Vernon 58, Keighery/Gibson 24A
Indigofera ? polygaloides M.Scott	Keighery/Gibson 229
Indigofera sp. A (Kimb Flora)	Keighery/Gibson 70
* *Macroptilium lathyroides* (L.)Urb.	Mitchell 2271
* *Stylosanthes guianensis* (Aubl.)Sw.	Keighery/Gibson 27
Templetonia hookeri (F.Muell.)Benth.	Vernon 05, Keighery/Gibson 123
Tephrosia leptoclada Benth.	Vernon 15
Tephrosia sp.	Vernon 49, Vernon 52
Vigna lanceolata Benth.	Vernon 61
Family Passifloraceae	
Adenia heterophylla (Blume)Koord.	Keighery/Gibson 137
* *Passiflora foetida* (L.) var. *hispida* (DC. ex Triana and Planchon) Killip	Keighery sr
Family Philydraceae	
Philydrum lanuginosum Gaertn.	Keighery sr
Family Poaceae	
Alloteropsis semialata (R.Br.)Hitchc.	Keighery/Gibson 290
Bothriochloa pertusa (L.)A.Camus	Mitchell 2269
* *Cenchrus ciliaris* L.	Keighery sr
* *Cenchrus echinatus* L.	Grey sn, Keighery/Gibson 133
Cenchrus elymoides F.Muell.	Keighery/Gibson 107
* *Cenchrus setiger*	Keighery/Gibson 132
* *Chloris barbata* (L.)Sw.	Keighery/Gibson 116
* *Chloris gayana* Kunth	Mitchell 2266
Chloris sp.	Keighery/Gibson 51
Chrysopogon latifolius S.T.Blake	Keighery/Gibson 102
Chrysopogon sp.	Keighery/Gibson 228
Cynodon dactylon (L.)Pers.	Keighery sr
* *Dactyloctenium aegyptium* (L.)Willd.	Keighery sr
Digitaria bicornis (Lam.)Roem.and Schult.	Keighery sr
* *Echinochloa colona* (L.)Link	Mitchell sr
* *Eleusine indica* (L.)Gaertn.	Keighery/Gibson 56, 58
Eragrostis tenella (L.)Roem.and Schult.	Keighery/Gibson 126
Eriachne avenacea R.Br.	Vernon 35, Fryxell 3918
Eriachne sulcata Hartley	Vernon 71
Heteropogon contortus (L.)P.Beauv.ex Roem.and Schult.	Vernon 73
Panicum decompositum R.Br.	Keighery/Gibson 35, 154
Paspalum scrobiculatum L.	Keighery/Gibson 34
Plectrachne hynoei C.E.Hubb.	Vernon 66
* *Rhynchelytrum repens* (Willd.)C.E.Hubb.	Vernon 65, Keighery/Gibson 115
* *Setaria pumila* (Poir.)Roem. and Schult.	Mitchell 2268
Sorghum ecarinatum Lazarides	Fryxell 3913
Sorghum plumosum (R.Br.)P.Beauv.	Keighery/Gibson 151
Spinifex longifolius R.Br.	Keighery sr
Sporobolus virginicus (L.)Kunth	Keighery sr
Triodia sp.	Keighery/Gibson 141, 144
* *Urochloa mosambicensis* (Hack.)Dandy	Keighery/Gibson 74
Urochloa subquadripara (Trin.)R.D.Webster	Keighery/Gibson 138
Whiteochloa cymbiformis (Hughes)B.K.Simon	Mitchell 2273
Family Polygalaceae	
Comesperma secundum Banks ex DC.	Vernon 60, Fryxell 4609

Family Polygonaceae	
* *Antigon leptopus* Hook. and Arnd.	Mitchell 3113
Family Portulacaceae	
Calandrinia uniflora F.Muell.	Keighery sr
Portulaca oleracea L.	Keighery sr
Portulaca pilosa L.	Keighery/Gibson 39
Family Proteaceae	
Grevillea agrifolia Cunn. ex R. Br.	Vernon 01, Keighery/Gibson 143
Grevillea cunninghamii R.Br.	Vernon 02, Marchant 72/12, White 08, Fryxell 4590
Grevillea pyramidalis A.Cunn.ex R.Br.	Vernon 03A
Grevillea refracta R.Br.	Vernon 03B
Persoonia falcata R.Br.	Keighery/Gibson 14
Stenocarpus sp. A (Kimb Flora)	Keighery/Gibson 221
Family Rhizophoraceae	
Ceriops tagal (Perr.)C.B.Rob.	Keighery/Gibson 223
Rhizophora stylosa Griff.	Keighery/Gibson 222
Family Rubiaceae	
Aidia racemosa (Cav.)D.D.Tirveng.	Keighery/Gibson 101
Canthium sp. A (Kimb Flora)	Keighery/Gibson 16
Oldenlandia corymbosa L. var. *corymbosa*	Keighery/Gibson 125A
Pavetta kimberleyana ST Reynolds	Keighery/Gibson 92
Spermacoce leptoloba Benth.	Vernon 41
Family Rutaceae	
Boronia lanuginosa Endl.	Fryxell 4600
Family Santalaceae	
Exocarpos latifolius R.Br.	Fryxell 4608
Santalum lanceolatum R.Br.	Keighery sr
Family Sapindaceae	
Atalaya hemiglauca (F.Muell.)F.Muell.ex Benth.	Keighery sr
Distichostemon hispidulus (Endl.)S.T.Reynolds var. *phyllopterus* (F.Muell.)S.T.Reynolds	Vernon 25, White 10
Dodonaea lanceolata F.Muell. var. *lanceolata*	Vernon 67
Family Sapotaceae	
Mimusops elengi L.	Keighery/Gibson 104
Pouteria sericea (Aiton)Baehni	Keighery/Gibson 23a
Family Scrophulariaceae	
Lindernia aff. *clausa* (F. Muell.)F. Muell.	Vernon 34
Stemodia lythrifolia F.Muell.ex Benth.	Marchant 72/6
Striga curviflora (R.Br.)Benth.	Vernon 37
Family Solanaceae	
* *Physalis minima* L.	Fryxell 3920, Keighery/Gibson 103
Family Sonneratiaceae	
Sonneratia alba Sm.	Keighery sr
Family Stackhousiaceae	
Stackhousia intermedia Bailey	Vernon 44
Family Sterculiaceae	
Brachychiton diversifolius R.Br.	Keighery/Gibson 07
Brachychiton viridiflorus (W.Fitzg.)Guymer	Keighery/Gibson 08
Brachychiton viscidulus (W.Fitzg.)Guymer	Fryxell 4591, Keighery/Gibson 63
Melhania oblongifolia F.Muell.	Vernon 53
Melochia umbellata (Houtt.)Stapf	Fryxell 3922, Keighery/Gibson 140
Waltheria indica L.	Vernon 17

Family Stylidiaceae	
Stylidium aff. *leptorrhizum* F. Muell.	Fryxell 4583, Vernon 59, Vernon sn
Family Taccaceae	
Tacca leontopetaloides (L.)Kuntze	Keighery/Gibson 117
Tacca maculata Seem.	Vernon 26
Family Tiliaceae	
Corchorus leptocarpus (A.Cunn.)Benth.	Fryxell 4595, Keighery/Gibson 22
Grewia breviflora Benth.	Keighery/Gibson 139, 224
Grewia retusifolia Kurz	Vernon 11, 25a, Keighery/Gibson 43
Triumfetta plumigera F.Muell.	Vernon 39, Fryxell 3919, 4616
Triumfetta sp.	Keighery/Gibson 21
Triumfetta sp.	Keighery/Gibson 86
Triumfetta sp. O (Kimb Flora)	Fryxell 3921
Triumfetta sp. S (Kimb Flora)	Vernon 63, Fryxell 4581
Family Turneraceae	
* *Turnera ulmifolia* L.	Keighery/Gibson 01, 118, Mitchell 2274
Family Typhaceae	
Typha domingensis Pers.	Keighery sr
Family Ulmaceae	
Celtis philippensis Blanco	Keighery/Gibson 225
Family Verbenaceae	
Callicarpa candicans (Burm.f.)Hochr.	Keighery/Gibson 03
Clerodendrum floribundum R.Br. var. *coriaceum* (R. Br.) Mold.	Vernon 45, Keighery/Gibson 124
Clerodendrum tomentosum (Vent.) R.Br. var. *lanceolatum* (F.Muell) Munir	Vernon 68
Premna acuminata R.Br.	Keighery/Gibson 90, 226, 227
Stachytarpheta cayennensis (Rich.)Vahl	Mitchell 3110
Vitex acuminata R.Br.	Vernon 08, Keighery/Gibson 23, 29, 81
Vitex glabrata R.Br.	Vernon 13
Family Violaceae	
Hybanthus aurantiacus (F.Muell.ex Benth.)F.Muell.	Keighery/Gibson 13
Hybanthus enneaspermus (L.)F.Muell.	Vernon 46
Family Vitaceae	
Ampelocissus acetosa (F.Muell.)Planch.	Keighery sr
Cayratia trifolia (L.)Domin	Keighery/Gibson 80
Cissus adnata Roxb.	Keighery sr
Family Zygophyllaceae	
Tribulopis angustifolia R.Br.	Keighery/Gibson 125